Design, construction, and evaluation of portable local exhaust ventilation system to control electrosurgery smokes

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Abstract

Background: Surgical smoke contains hazardous chemicals and biological agents. The use of standard surgical masks alone does not provide adequate protection against surgical smokes. Hence, the application of a local exhaust ventilation system to evacuate surgical smokes is recommended.

Objective: To design, construct, and evaluate a portable local exhaust ventilation system to control electrosurgery smokes.

Methods: This was an experimental study carried out at Qazvin University of Medical Sciences, in 2010. A new local exhaust ventilation system containing a high efficiency air cleaner system, was designed, constructed, and evaluated in a simulated surgery process.

Findings: When the distance between the system hood and the pollution sources was 5 cm and the air flow 22 cubic feet per minute, the total surgical smoke was attracted to the system hood at a velocity of 80 feet per minute. In a period of 60 minutes, the cleaning efficiency for particulate agents as well as the gasses and vapors emission was 99.77% indicating that the application of ventilation system prevented the entry of contaminants emission into the operating room.

Conclusion: Based on results obtained through simulated surgery process, it was concluded that the ventilation system designed in this study completely blocked the emission of surgical smoke to air of operating room and personnel exposure.

Keywords: Pollutants, Operating room, Ventilation, Electro cutter, Surgical smoke

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